

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A non-aqueous rechargeable lithium battery having a lithium insertion compound positive electrode, a negative electrode of one or more of lithium, lithium compound, and carbon, a solvent for a non-aqueous electrolyte containing a lithium salt and a blend of flame retardants and anode passivation additives, and gassing suppression additives, said flame retardant additive selected from one or more of aryl/alkyl phosphate, such as a triphenyl phosphate, $(C_6H_5)_3PO_4$, a diphenyl monobutylphosphate, (DMP) $C_4H_9(C_6H_5)_2PO_4$, and a phenyl alkyl phosphate, $(C_6H_5)R_2PO_4$, a cyclic ethyl carbonate, $C_2H_4CO_3$, and derivatives thereof, where the 1 to 4 hydrogen groups are replaced with a C1-C6 alkane, a fluoridated C1-C6 alkane, an unsaturated alkane carbonate and a mixtures thereof, and said anode passivation material being one or more of the following: vinyl ethylene carbonate vinyl quinone, vinylcrotonate, 9-fluorenone, vinyl acetate, tribally triazine trione, 4,5-diethenyl-1,3-dioxolan-2-one, 4-ethenyl benzene-1,3-dioxolan-2-one, methyl silyl carbonate, 1,5-hexene-2,3-carbonate, 4-methyl-4-silyl-1,3-dioxolan-2-one, 4,5-diphenyl-1,3-dioxolan-2-one, 4,4-diphenyl-1,3-dioxolan-2-one, vinyl ethylene sulfite, 4-methoxymethyl-1,3-dioxolan-2-one, 4-hydroxymethyl-1,3-dioxolan-2-one, 4-(1-propenoxyethyl)-1,3-dioxolan-2-one, 4-(2-propenyl)-1,3-dioxolan-2-one, ethyl-2-furoate, 4-ethenol-1,3-dioxolan-2-one, 2-methoxy-1,3-dioxolan, divinylphenyl carbonate, dicarbonate quinone, ec hydrazine, bis-N,N-dimethylcarbamate, 4,4-dimethyl-5-methylene-1,3-dioxolan-2-one, benzene tetracarboxyldianhydride, 4-methoxyphenyl-1,3-dioxolan-2-one, 4-trifluorobenzyl-1,3-dioxolan-2-one.

2. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is one of the following or combination thereof: vinylcrotonate, 9-fluorenone, vinyl acetate, tribally triazine trione, 4,5-diethenyl-1,3-dioxolan-2-one, 4-ethenyl benzene-1,3-dioxolan-2-one, methyl silyl

carbonate, 1,5-hexene-2,3-carbonate, 4-methyl-4-silyl-1,3-dioxolan-2-one, 4,5-diphenyl- 1,3-dioxolan-2-one, 4,4-diphenyl-1,3-dioxolan-2-one, vinyl ethylene sulfite, 4-methoxymethyl-1,3-dioxolan-2-one, 4-hydroxymethyl-1,3-dioxolan-2-one, 4-(1-propenoxyethyl)-1,3-dioxolan-2-one, 4-(2-propenyl)-1,3-dioxolan-2-one, ethyl-2-furoate, 4-ethenol-1,3-dioxolan-2-one, 2-methoxyl-1,3-dioxolan, divinylphenyl carbonate, dicarbonate quinione, ec hydrazine, bis-N,N-dimethylcarbamate, 4,4-dimethyl-5-methylene-1,3-dioxolan-2-one, benzene tetracarboxyldianhydride, 4-methoxyphenyl-1,3-dioxolan-2-one, 4-trifluorobenzyl-1,3-dioxolan-2-one.

3. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is a mixture of monobutyl-diphenyl phosphate, dibutyl-monophenyl phosphate and vinyl ethylene carbonate.

4. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is a mixture of monopropyl-diphenyl phosphate, dipropyl-monophenyl phosphate and vinyl ethylene carbonate.

5. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is a mixture of triphenyl phosphate, vinyl ethylene carbonate and dibutyl-monophenyl phosphate.

6. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is a mixture of monobutyl-diphenyl phosphate and diamyl-monophenyl phosphate and vinyl ethylene carbonate.

7. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is monobutyl-diphenyl phosphate and vinyl ethylene carbonate.

8. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is dibutyl-monophenyl phosphate and vinyl ethylene carbonate.

9. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is tripropyl phosphate, triphenyl phosphate, and ethyl-2-furoate

10. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is monoamyl-diphenyl phosphate and methyl silyl carbonate

11. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is a mixture of triphenyl phosphate and vinyl ethylene carbonate, present up to about 3-wt% of the electrolyte.

12. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is a mixture of monofluoroethylene carbonate and triphenyl phosphate, each present up to about 3 wt% of the electrolyte.

13. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is vinyl ethylene carbonate and tributyl phosphate and a fluoridated hexane.

14. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is monoamyl-diphenyl phosphate, and vinyl ethylene sulfite

15. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is a mixture of triphenyl phosphate, monoamyl-diphenyl phosphate and vinyl ethylene carbonate.

16. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is monophenyl ethylene carbonate and monophenyl dibutyl phosphate.

17. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is a mixture of monophenyl carbonate and triphenyl phosphate.

18. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is a mixture of 1,2-difluoroethylene carbonate and triphenyl phosphate.

19. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is a mixture of 1,2-difluoroethylene carbonate, triphenyl phosphate and monobutyl-diphenyl phosphate.

20. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is monofluorovinyl ethylene carbonate, and tripropyl phosphate.

21. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the additive is a mixture of monofluorovinyl ethylene carbonate and triphenyl phosphate.

22. A non-aqueous rechargeable lithium battery as in Claim 1, wherein the total concentration of additive is between 0.01 wt% and 20wt% by weight of the electrolyte.

23. A non-aqueous rechargeable lithium battery as in Claim 1, in which said additive is vinyl ethylene carbonate and tributyl phosphate.

24. A non-aqueous rechargeable lithium battery as in Claim 1, in which said additive is vinyl quinone.

25. A non-aqueous rechargeable lithium battery as in Claim 1, in which said additive is mixture of vinyl crotonate or derivative thereof and triphenyl phosphate.

26. A non-aqueous rechargeable lithium battery as in Claim 1, in which said additive is a mixture of 9-fluorenone, and tripropyl phosphate.

27. A non-aqueous rechargeable lithium battery as in Claim 1, in which said compound is vinylimidazole.

28. A non-aqueous rechargeable lithium battery as in Claim 1, in which said additive is N-vinyl-2 pyrrolidinone and triphenyl phosphate.

29. A non-aqueous rechargeable lithium battery as in Claim 2, in which said compound is added in a proportion of 0.001% to 20% by weight of said electrolyte.

30. A non-aqueous rechargeable lithium battery as in Claim 1, in which the solvent includes propylene carbonate and one or more solvents selected from ethylene carbonate, dimethyl carbonate, ethyl methyl carbonate or similar organic carbonate solvents.

31. A non-aqueous rechargeable lithium battery as in Claim 1, in which said lithium salt is selected from lithium hexafluorophosphate, lithium tetrafluoroborate, lithium hexafluoroarsenate lithium perchlorate or amide salt.

32. A non-aqueous rechargeable lithium battery as in Claim 1, in which said positive electrode is selected from an oxide or phosphate of lithium metal or manganese, nickel, cobalt and iron, or a combination thereof.